

Claims

1. Handsfree system for use in a vehicle comprising a microphone array with at least two microphones and a signal processing means

characterized in that

the signal processing means comprises a superdirective beamformer with fixed superdirective filters.

2. Handsfree system according to claim 1 wherein the beamformer is a regularised superdirective beamformer using a finite regularisation parameter μ , in particular, a finite regularisation parameter μ depending on the frequency.
3. Handsfree system according to claim 1 or 2 wherein each superdirective filter results from an iterative design based on a predetermined maximum susceptibility.
4. Handsfree system according to one of the preceding claims wherein each superdirective filter is a filter in the time domain.
5. Handsfree system according to one of the preceding claims wherein the signal processing means further comprises at least one inverse filter, in particular, a warped inverse filter, for adjusting a microphone transfer function.
6. Handsfree system according to claim 5 wherein each inverse filter is an approximate inverse of a non-minimum phase filter.
7. Handsfree system according to claim 5 or 6 wherein each inverse filter is combined with a superdirective filter of the beamformer.
8. Handsfree system according to one of the preceding claims wherein the beamformer has the structure of a generalised sidelobe canceller (GSC).
9. Handsfree system according to one of the preceding claims wherein the beamformer is a minimum variance distortionless response (MVDR) beamformer.

10. Handsfree system according to one of the preceding claims wherein the microphone array comprises at least two microphones being arranged in endfire orientation with respect to a first position.
11. Handsfree system according to claim 12 wherein the microphone array comprises at least two microphones being arranged in endfire orientation with respect to a second position.
12. Handsfree system according to claim 13 wherein the at least two microphones in the first endfire orientation and the at least two microphones in the second endfire orientation have a microphone in common.
13. Handsfree system according to one of the preceding claims wherein the microphone array comprises at least two subarrays.
14. Handsfree system according to claim 15 wherein at least two subarrays have at least one microphone in common.
15. Handsfree system according to one of the preceding claims further comprising a frame wherein each microphone of the microphone array is arranged in a predetermined, in particular fixed, position in or on the frame.
16. Handsfree system according to one of the preceding claims wherein at least one microphone is a directional microphone, in particular, having a cardioid characteristic and/or being a differential microphone.
17. Vehicle comprising a handsfree system according to one of the preceding claims.